



US Army Corps
of Engineers

Construction Bulletin

No. 95-2 Issuing Office: CEMP-CE Issue Date: 1/13/95 Exp. Date: 31 Dec 97

CEMP-C

Subject: Use of the Metric System on Corps projects

Applicability: GUIDANCE

1. The purpose of this Construction Bulletin is to provide information on the use of the Metric System. The Metric Conversion Act of 1975 (PL 94-168) as amended by the Omnibus Trade and Competitiveness Act of 1988 (PL 100-418), and Executive Order (EO) 12770 dated July 25, 1991 require that new project designs be developed using the Metric system of measurement as of January 1, 1994. General Stevens has disseminated Metric Design Policy for Military Construction on 21 November 1994.

2. Some pertinent aspects of this policy are as follow:

a. All CEGS for military construction have been revised to include metric designations. The designer will select either metric (SI) or inch-pound (IP) units. When the SI option is selected, the appropriate units for a metric project will be printed. In general only metric units will be shown for field dimensional data and products available using metric designations. Dual units will be shown when a metric designated product is not available or when IP units are needed to clarify or trace back to referenced industry standards, such as ASTM or ASME, that do not include appropriate metric designations. In these cases, the metric unit will be shown first followed by the appropriate IP value in parenthesis; however the IP value governs.

b. Guide specification CEGS-01030 contains information regarding metric implementation of benefit to the construction contractor and should be included in all metric projects.

c. Drawings up to 1:200 will use millimeters (mm) and include a note that all units are in millimeters (mm) unless otherwise indicated. Drawings over 1:200 (site and location drawings for example) will be in meters (m) and include a note that all units are in meters (m) unless otherwise indicated. Centimeters (cm) shall not be used on drawings or in printed matter. Examples of metric design modules are: 100 mm (in lieu of 4 inches), 600 mm (in lieu of 2 feet), 1200 mm (in lieu of 4 feet), and 400 mm on center (in lieu of 16 inches on center).

CEMP-CE

Subject: Use of Metric System on Corps projects

d. Where compliance with safety or other code requirements is necessary, the metric dimension may be an exact conversion of the IP value or a conservatively rounded conversion of a maximum or minimum IP value.

e. For ductwork and other sheet metal applications, the metric equivalents for galvanized sheet, uncoated steel, stainless steel and aluminum sheet thickness shall be from the nominal millimeter thickness shown in SMACNA "HVAC Duct Construction Standards" 1985 edition.

f. Degree-days in project specifications or other written project documents will be shown in dual units. For example: 2222 Celcius degree days (4000 fahrenheit degree days).

g. Conductor sizes shown in American Wire Gauge (AWG) or Thousand Circular Mils (MCM) will not be given a metric equivalent. The sizes will remain AWG or MCM until availability of wire manufactured to ASTM B682 standard metric conductor sizes, is determined. See Table B-1 for metric conduit sizes.

h. All HVAC control equipment and devices including meters, thermostats, gauges, etc, operating ranges, setpoints, actuator signals and pressures, and similar control system components and installation requirements shall be shown on project drawings and in project specifications as IP units only. This requirement for IP units only may be changed when current HVAC criteria revisions are completed. See Table 1 specific requirements for pipe sizes.

i. Factory fabricated storage tanks for fuel storage and similar applications shall use liters (L) as the metric measurement. Site fabricated storage tanks (over 50,000 gallons) shall use cubic meters (m3) as the metric measurement.

3. Information about metric construction materials and their manufacturers is now available from the Construction Criteria Base (CCB) system under the General Services Administration (GSA) criteria. Huntsville Division has developed one EXPORTABLE (video) training course which provides an introduction to, and a basic understanding of the metric system. In addition, it covers rules of reading and writing metric. One copy of this course was distributed to districts, laboratories, and FOAs in May 1994. A second course is being developed which will address design specifics for design and construction professionals using the metric system.



CHARLES R. SCHROER

Chief Construction Division

Directorate of Military Programs

SPECIFIC REQUIREMENTS.

a. All piping, pipe fittings, and valves shall be indicated on project drawings in millimeters (mm). The metric designation shall be as indicated in Table I, Pipe, Valves and Fittings, IP and Metric Designations. A table similar to this will be placed on the project drawings. The project specifications will show piping, pipe fittings and valves in dual units. The IP designations can be used to trace back to the referenced industry standards.

TABLE I
PIPE, VALVES AND FITTINGS IP AND METRIC DESIGNATIONS

Nominal Pipe Size (inches)	Metric Identification millimeter (mm)		Nominal Pipe Size (inches)	Metric Identification millimeter (mm)
1/8	6		8	200
3/16	7		10	250
1/4	8		12	300
3/8	10		14	350
1/2	15		16	400
5/8	18		18	450
3/4	20		20	500
1	25		24	600
1-1/4	32		28	700
1-1/2	40		30	750
2	50		32	800
2-1/2	65		36	900
3	80		40	1000
3-1/2	90		44	1100
4	100		48	1200
4-1/2	115		52	1300
5	125		56	1400
6	150		60	1500

NOTE: The metric designation for all pipe, valves and fittings over 60 inches will be 25 mm per inch.

**DISCIPLINE SPECIFIC REQUIREMENTS
ELECTRICAL ENGINEERING**

1. All conduits, tubing and fittings shall be indicated on project drawings in millimeters (mm). The metric designation shall be as indicated in Table B-I, NEMA APPROVED METRIC SIZE DESIGNATIONS(ELECTRICAL CONDUITS). A table similar to this will be placed on the project drawings. The project specifications will show conduits, tubing and fittings in dual units. The IP designations can be used to trace back to the referenced standards.

TABLE B-I
NEMA APPROVED METRIC SIZE
DESIGNATIONS
(ELECTRICAL CONDUIT)

USA TRADE SIZE	METRIC SIZE DESIGNATIONS
1/2"	16 mm
3/4"	21 mm
1"	27 mm
1-1/4"	35 mm
1-1/2"	41 mm
2"	53 mm
2-1/2"	63 mm
3"	78 mm
3-1/2"	91 mm
4"	103 mm
5"	129 mm
6"	155 mm

Conduit Cross sections: Electrical conduit is similar to piping; it is produced in "soft" decimal inch dimensions but is identified in nominal inch sizes. Neither metallic nor nonmetallic conduit will change size; they will be relabeled in metric as shown in the above table. These metric designations were assigned by the National Electrical Manufacturers Association.